

Exelon Generation
Dresden Generating Station
6500 North Dresden Road
Morris, IL 60450-9765
Tel 815-942-2920

www.exeloncorp.com

Nuclear

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Dresden Nuclear Power Station, Unit 3
Facility Operating License No. DRP-25
NRC Docket No. 50-249

Subject: Licensee Event Report 2004-001-00, "Unit 3 Automatic Scram During Testing of the Main Turbine Master Trip Solenoid Valves"

Enclosed is Licensee Event Report 2004-001-00, "Unit 3 Automatic Scram During Testing of the Main Turbine Master Trip Solenoid Valves," for Dresden Nuclear Power Station. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B) of this section."

Should you have any questions concerning this report, please contact Jeff Hansen, Regulatory Assurance Manager, at (815) 416-2800.

Respectfully,



Danny G. Bost
Site Vice President
Dresden Nuclear Power Station

Enclosure

cc: Regional Administrator - NRC Region III
NRC Senior Resident Inspector - Dresden Nuclear Power Station

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NRC FORM 366 (7-2001)			U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OBM NO. 3150-0104 EXP 7-31-2004 Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.					
LICENSEE EVENT REPORT (LER)											
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4. TITLE Unit 3 Automatic Scram During Testing of the Main Turbine Master Trip Solenoid Valves											
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED		
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER	
01	24	2004	2004	001	00	03	24	2004	N/A	N/A	
9. OPERATING MODE		1		11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)							
10. POWER LEVEL		096		20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)	
				20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)	
				20.2203(a)(1)		50.36(c)(1)(i)(A)		X 50.73(a)(2)(iv)(A)		73.71(a)(4)	
				20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)	
				20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A	
				20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)			
				20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)			
				20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)			
				20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)			
				20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)			
12. LICENSEE CONTACT FOR THIS LER											
NAME						TELEPHONE NUMBER (Include Area Code)					
George Papanic Jr.						(815) 416-2815					
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT											
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	
B	TG	SOL	G080	Y							
14. SUPPLEMENTAL REPORT EXPECTED						15. EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR	
YES (If yes, complete EXPECTED SUBMISSION DATE)						X NO					

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On January 24, 2004, at 0037 hours (CST), with Unit 3 at 96 percent power in Mode 1, an automatic scram occurred while performing the weekly surveillance of the Main Turbine Master Trip Solenoid Valves. The surveillance testing was performed in accordance with procedure DOS 5600-02, "Periodic Main Turbine, EHC and Generator Tests." The event was caused by a malfunction of the Main Turbine Master Trip Solenoid Valves, which resulted in the depressurization of the Emergency Trip Supply hydraulic header and the resulting momentary closure of the Main Turbine Stop Valves below 90 percent full open. The Reactor Protection System actuated as a result of the Main Turbine Stop Valve position and, as designed, automatically scrammed the reactor. The plant responded as expected to the automatic scram.

The root cause of the malfunction of the Main Turbine Master Trip Solenoid Valves was attributed to an improperly designed position switch rod and its associated housing by the Original Equipment Manufacturer, General Electric. The corrective actions to prevent reoccurrence are to replace the Main Turbine Master Trip Solenoid Valves with valves of a different design.

The safety significance of this event was minimal. All control rods fully inserted and all systems responded as expected to the automatic scram. There were no subsequent major equipment malfunctions.

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

Dresden Nuclear Power Station Unit 3 is a General Electric Company Boiling Water Reactor with a licensed maximum power level of 2957 megawatts thermal. The Energy Industry Identification System codes used in the text are identified as [XX].

A. Plant Conditions Prior to Event:

Unit: 03

Event Date: 01-24-2004

Event Time: 0037 CST

Reactor Mode: 1

Mode Name: Power Operation

Power Level: 96 percent

Reactor Coolant System Pressure: 1000 psig

B. Description of Event:

Dresden Nuclear Power Station (Dresden) and other Exelon stations have been experiencing performance issues with their Main Turbine Master Trip Solenoid Valves (MTSVs) [TG] [SOL]. The cause of the poor solenoid performance was determined to be a "sitting" phenomenon. General Electric (GE), the Original Equipment Manufacturer, was requested to evaluate the "sitting" condition and find an alternate design to improve the solenoid performance. GE responded to this request by proposing the use of poppet solenoid MTSVs to replace the existing spool solenoid MTSVs. GE indicated that, unlike the spool valve, a poppet valve is not prone to stick due to its inherent design. The poppet solenoid valve has a line-contact on its seating surface verses a sliding surface contact with tight clearance tolerances on a spool solenoid valve.

GE successfully tested the poppet solenoid MTSVs. However, after completing the testing, GE modified the position switch on the original poppet solenoid valve assembly. This modification was done to eliminate the need of additional cables to power the position switch. The modified position switch was never tested on the test assembly. GE's evaluation concluded that the new poppet solenoid MTSV was a direct replacement for the currently used spool solenoid MTSV.

In September 2003, LaSalle County Station (LaSalle) was preparing for a Unit 2 outage and performed pre-installation testing of the poppet solenoid MTSVs. During pre-installation testing, LaSalle identified that the position switch on the poppet valve assembly was not functioning. GE suspected that the target area at the end of the switch rod was too small for it to function properly and decided to increase the target area of the switch. LaSalle returned the poppet solenoid MTSVs for switch modification and the poppet solenoid MTSVs were not installed.

In October 2003, Dresden performed pre-installation testing on the poppet solenoid MTSVs and found that the limit switch was still not functioning properly, even after the target area on the rod end had been increased based on the LaSalle experience. Further investigation revealed that the switch adapter material should have been stainless steel instead of carbon steel. GE agreed to make the adapter material change but additional testing following the change by GE was not performed.

On October 21, 2003, Dresden Unit 2 was in a refueling outage and the MTSVs were replaced with the poppet solenoid MTSVs. Post maintenance testing was performed satisfactorily without any problems.

On November 18, 2003, during weekly testing on Unit 3 per procedure DOS 5600-02, "Periodic Main Turbine, EHC and Generator Tests," MTSV "A" failed to trip. The cause of this MTSV failure to trip was determined to be "sitting." Based on this, Dresden engineering recommended that the Unit 3 MTSVs be replaced with poppet solenoid MTSVs during the upcoming maintenance outage in December 2003.

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On December 12, 2003, the Unit 3 MTSVs were replaced with poppet solenoid MTSVs. Post maintenance testing was performed with satisfactory results.

From November 2003 to January 23, 2004, Dresden Unit 2 successfully tested the poppet solenoid MTSVs during nine weekly on-line tests and Dresden Unit 3 successfully tested the valves during four weekly on-line tests.

On January 24, 2004, at 0037 hours (CST), with Unit 3 at 96 percent power in Mode 1, an automatic scram occurred while performing the weekly surveillance of the MTSVs. The surveillance testing was performed in accordance with applicable site procedures. The scram was caused by the momentary closure of the Main Turbine Stop Valves below 90 percent full open. The Reactor Protection System actuated as a result of the Main Turbine Stop Valve position and as designed, automatically scrambled the reactor. The plant responded as expected to the automatic scram.

An Emergency Notification System (ENS) call was made on January 24, 2004, at 0222 hours (CST) for the above-described event. The assigned ENS event number was 40474.

Post trip testing confirmed that the cause of the automatic scram was the result of the poppet solenoid MTSVs malfunctioning. Dresden decided to replace the Unit 3 poppet solenoid MTSVs with spool solenoid MTSVs. The decision was based in part on, the failure mode associated with the poppet solenoid MTSVs was not applicable to the spool solenoid MTSVs. The spool solenoid MTSVs are installed on all GE turbines of similar design to Dresden's turbine and, except for occasional sticking, the performance of the spool solenoid MTSVs has been satisfactory. The unit was synchronized to the grid on January 25, 2004 at 1324 hours (CST).

This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B) of this section." The automatic actuation of the reactor protection system is listed in 10 CFR 50.73(a)(2)(iv)(B).

Dresden Unit 2 is scheduled to replace its installed poppet solenoid MTSVs with the spool solenoid MTSVs during a maintenance outage. Dresden has completed an engineering evaluation that permits the suspension of MTSV testing until the MTSVs are replaced.

Additionally to resolve the "silting" issue, Dresden replaced the existing electro-hydraulic fluid with higher temperature rated synthetic fluid, cleaned the fluid reservoirs and replaced the filter cartridges with a different designed cartridge in October 2003 on Unit 2 and December 2003 on Unit 3.

C. Cause of Event:

The root cause of the malfunction of the poppet solenoid MTSVs was attributed to an improperly designed position switch rod and its associated housing by the Original Equipment Manufacturer, GE.

The two poppet solenoid MTSVs that were removed from Dresden Unit 3 and two poppet solenoid MTSVs that had not been installed were subjected to failure analysis testing. The failure analysis testing included response time testing, disassembly to inspect for foreign material and overall inspection of the internal valve components. The results of the testing were as follows.

- The poppet solenoid MTSVs were bench tested to determine if their response times were in the range of 40 to 60 millisecond. A high response time of the poppet valve is a concern as the poppet solenoid

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MTSVs design momentarily ties the pressure and drain ports together. If the ports are tied together for a sufficient time, the Emergency Trip Supply hydraulic header will depressurize. One of the poppet solenoid MTSVs removed from Dresden Unit 3 had a response time of 200 milliseconds.

- An optical microscope inspection of the poppet solenoid MTSVs did not reveal any foreign material around the valve seat area. Additionally, the inspection found no indication of tearing or deterioration of the internal o-rings and backing rings.
- The overall visual inspection revealed that the internal position switch rod was bent on all four valves. Further examination revealed that the target could catch on threads within the switch housing. This defect would cause the observed delay in the response time of the valves.
- GE determined that the damage to the internal components most probably occurred during manufacturing.

The high response time of the poppet valves on Unit 3 caused the pressure and drain ports to be tied together for a sufficient time to cause the Emergency Trip Supply hydraulic header to depressurize and resulted in the momentary closure of the Main Turbine Stop Valves below 90 percent full open.

D. Safety Analysis:

The safety significance of this event was minimal. All control rods fully inserted and all systems responded as expected to the automatic scram. There were no subsequent major equipment malfunctions. Therefore, the consequences of this event had minimal impact on the health and safety of the public and reactor safety.

E. Corrective Actions:

The poppet solenoid MTSVs were replaced with spool solenoid MTSVs on Dresden Unit 3.

The poppet solenoid MTSVs will be replaced with the spool solenoid MTSVs during a scheduled maintenance outage on Dresden Unit 2.

An engineering evaluation was completed to permit the suspension of MTSV testing on Unit 2 until the poppet solenoid MTSVs are replaced with spool solenoid MTSVs.

F. Previous Occurrences:

A review of Dresden Nuclear Power Station Licensee Event Reports (LERs) and operating experience over the previous five years did not find any similar MTSV occurrences.

G. Component Failure Data:

GE poppet solenoid MTSV Part Number 378A3294P0001